Exploring the Teaching Reform of Intelligent Manufacturing Technology Course under the Background of Building a First Class Applied University

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Abstract

With the continuous promotion of building a first-class applied university in Chinese universities, and the rapid development of intelligent manufacturing technology in the new situation, teaching reform for intelligent manufacturing courses is crucial. This article aims to explore a plan for the teaching reform of intelligent manufacturing technology courses, in order to improve the quality of talent cultivation and adapt to the development needs of the intelligent manufacturing industry. The article first analyzes the current situation and problems in the teaching of intelligent manufacturing courses, then proposes targeted reform plans, and finally elaborates on the effectiveness and conclusions of this plan in classroom implementation.

Keywords

Intelligent manufacturing, Teaching innovation, Curriculum reform, Talent cultivation.

1. Introduction

Intelligent manufacturing refers to the process of continuously promoting the digitization, networking, and intelligence of the manufacturing industry, improving production efficiency and product quality. With the advent of Industry 4.0, intelligent manufacturing technology has become an important development direction for the manufacturing industry and is increasingly becoming an important "new quality" productivity. Intelligent manufacturing technology can promote the transformation and upgrading of the manufacturing industry, and promote its development towards high-end, intelligent, and green directions. By introducing and developing intelligent manufacturing technology, the technological level and innovation ability of the manufacturing industry can be improved, and the transformation, upgrading, and high-quality development of the manufacturing industry can be achieved. In order to adapt to this trend, higher education institutions urgently need to carry out relevant teaching settings and reforms in the course of intelligent manufacturing technology, in order to cultivate new era manufacturing talents with innovative abilities and practical experience.

In recent years, domestic and foreign scholars have conducted a series of studies on the teaching reform of intelligent manufacturing courses. Although there have been many studies on the teaching reform of intelligent manufacturing courses, there are still the following problems:① The teaching content is disconnected from the actual needs of the industry, making it difficult for students to apply theoretical knowledge to practice;② The teaching method is single, lacking teacher-student interaction and teamwork, making it difficult to stimulate students' interest in learning;③ Lack of a teaching team with practical engineering experience affects the cultivation of students' practical abilities;④ The assessment method is fixed, emphasizing too much on the examination of theoretical knowledge and neglecting the assessment of practical ability.

In response to the above issues, this article proposes targeted solutions.

2. Reform Plan

(1) Reform of teaching content

Intelligent manufacturing technology is constantly developing and evolving, with new technologies and tools constantly emerging. This means that teachers need to constantly update their teaching content during the teaching process to adapt to the rapid development of technology. Teachers need to pay attention to industry development trends, introduce new technologies and methods in a timely manner, so that students can understand and master the latest intelligent manufacturing technology, and strengthen the cultivation of students' practical abilities. The teaching content should closely follow the development of intelligent manufacturing technology, update textbooks and course content in a timely manner, and integrate the latest technologies and trends into teaching. Multiple methods such as project-based, case-based, and problem-based can be adopted to combine theoretical knowledge with practical skills, enabling students to comprehensively understand and master the connotation and application of intelligent manufacturing technology.

(2) Reform of teaching methods

Adopting diversified teaching methods, increasing teacher-student interaction and teamwork, and stimulating students' interest in learning. The teaching methods should be diversified, adopting a hybrid teaching mode that combines online and offline. Publish preview materials through online platforms, and conduct in-depth discussions and practical operations in offline classrooms. At the same time, organize students to engage in group discussions, case studies, and practical problem-solving activities to enhance the cultivation of teamwork skills. By utilizing multimedia technology, online platforms, and other means, encourage students to engage in self-directed and research-based learning, and enhance their interest and participation in learning.

(3) Improvement of teachers' teaching ability

Strengthen the construction of the curriculum teacher team, introduce teachers with practical engineering experience, and improve the quality of teaching. Reform the assessment methods, increase the assessment of practical abilities, and promote the improvement of students' practical abilities. We can adopt methods such as teacher team building, regular teaching and research seminars, teacher exchange and training, and enterprise on-the-job training to promote communication and cooperation among teachers and improve the overall quality of the teaching team.

(4) Reform of assessment methods

Adopting various assessment methods, including regular grades, experimental grades, course design grades, final exams, etc., to comprehensively evaluate students' learning situation and ability level. Regular grades can include performance in classroom discussions, group assignments, practical operations, etc. Experimental grades can include performance in experimental reports, experimental operations, etc. Curriculum design grades can include performance in program design, implementation process, and outcome evaluation, etc. The final exam can be conducted through closed book or open book exams.

3. Implementation Process

This paper takes the teaching reform of the basic course of intelligent manufacturing technology in Mount Taishan University as an example to elaborate on the implementation process of the above reform scheme:

(1) Timely adjustment of teaching content.

Our school has successively reached school-enterprise cooperation with national high-tech enterprises and education and training professional companies such as Shandong Zecheng CNC

Machinery Co., Ltd., Shandong Jingshi Intelligent Technology Co., Ltd., Shandong Shuangyuan Education Co., Ltd., to jointly develop the teaching outline and lesson plan for intelligent manufacturing courses. Introduce advanced intelligent manufacturing technology, experience, and cases from enterprises into the classroom, so as to closely connect the teaching content with the actual needs of the industry.

(2) Improvement of teaching methods

Our school has successively purchased and equipped professional online teaching cloud platforms such as Super Star "Learning Pass" and "Rain Classroom", and teachers use a hybrid teaching mode that combines online and offline. Release preview materials through the online platform "Learning Pass", and conduct in-depth discussions and practical operations in offline classrooms. At the same time, organize students to engage in group discussions, case studies, and practical problem-solving activities to enhance the cultivation of teamwork skills. Teachers closely adhere to practical needs and carry out open research projects such as "The Application of Intelligent Manufacturing in the Automotive Manufacturing Industry". Students are grouped every 3-4 people to search, compile, organize, and refine information on the topic. Finally, through the novel form of "flipped classroom", each group of students is allowed to give speeches and explanations through classroom PPTs, greatly mobilizing their learning enthusiasm and enthusiasm.

(3) Teacher Capacity Building

Qi Enbing, a teacher who undertakes the teaching task of the basic course of intelligent manufacturing technology in our school, has rich theoretical and practical experience. He is active in the production line of cooperation with enterprises and universities all year round and has rich experience in horizontal research projects. At the same time, the teacher enriches their engineering skills through corporate suspension training. Teacher Qi Enbing is a temporary technical chief engineer at the hydraulic branch of Nanjing Chenguang Group Co., Ltd., a large state-owned military enterprise, responsible for the key technical research projects of the unit. The teacher's theory, research projects, and corporate experience further support the effective teaching of knowledge in the basic courses of intelligent manufacturing technology.

(4) Assessment method

Adopting a combination of regular grades and final exams for assessment. The usual performance mainly includes classroom discussions, group assignments, practical operations, and other aspects; The final exam focuses on analyzing practical cases and proposing solutions, with a focus on examining students' practical abilities and innovative thinking.

4. Implementation Effect

After a semester of reform practice, this article evaluates the implementation effectiveness from the following aspects:

(1) Student feedback

Most students acknowledge and are satisfied with the reformed intelligent manufacturing course. They believe that the teaching content is more practical, and the teaching methods are more flexible and diverse, which is beneficial for improving their learning interest and participation.

(2) Teaching supervision and evaluation

Teaching supervisors generally believe that the reformed intelligent manufacturing course is more practical and challenging, which helps to improve the quality of teaching and the overall quality of students.

(3) Achievement display

The students performed well in the presentation of the results after the course, applying their knowledge to solve a series of practical problems, and demonstrating their innovative ability and teamwork spirit. At the same time, the exercise has improved students' expression and public speaking abilities.

(4) Enterprise feedback

The cooperative enterprise highly evaluates the performance of students and believes that their practical ability and innovative awareness have been greatly improved. They hope to continue cooperating with universities to jointly promote talent cultivation in the field of intelligent manufacturing and continue to provide high-quality intelligent manufacturing talents for enterprises.

5. Conclusion

This article proposes targeted reform plans by analyzing the current situation and problems in the teaching of intelligent manufacturing technology courses. Through a semester of practice, it has been proven that these reform measures have effectively improved students' practical abilities and innovative thinking, and have also been highly recognized by teachers and enterprises. However, teaching reform is a long-term process, and in the future, it is necessary to continuously optimize and improve teaching content, teaching methods, and assessment methods to better adapt to the needs of industry development and the goal of talent cultivation. At the same time, it is necessary to further study the characteristics and laws of the interdisciplinary integration of intelligent manufacturing technology, strengthen the interdisciplinary integration with other majors, and cultivate composite talents with interdisciplinary backgrounds. In addition, it is necessary to continuously update the knowledge structure and technical level of the teaching staff, improve their practical ability and educational teaching level, in order to better guide students.

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